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10/670,384

09/26/2003

Masato Iwanaga

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7590

06/25/2007

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EXAMINER

CANTELMO, GREGG

ART UNIT

PAPER NUMBER

1745

MAIL DATE

DELIVERY MODE

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/670,384	<b>Applicant(s)</b> IWANAGA ET AL.	
	<b>Examiner</b> Gregg Cantelmo	<b>Art Unit</b> 1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 16 April 2007.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 2,3 and 5-10 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 2,3 and 5-10 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on April 16, 2007 has been entered.

### ***Response to Amendment***

2. In response to the amendment received April 16, 2007:
- a. Claims 2, 3, 5-10 are pending;
  - b. The previous prior art rejections of record stand as modified.

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 2, 3 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 2002-025611 A (JP '611) in view of U.S. Patent No. 6,632,572 (Takahashi); U.S. Patent No. 6,818,351 (Sunagawa) and either JP 2002-298909 (JP '909), JP 2002-110229 (JP' 229).

JP '611 discloses of a non-aqueous electrolyte secondary cell comprising a positive electrode intercalating and deintercalating lithium ions, a negative electrode intercalating and deintercalating lithium ions, and a non-aqueous electrolyte having a non-aqueous solvent and an electrolyte salt, wherein, the non-aqueous electrolyte includes a vinylene carbonate compound and a cyclic sulfite compound (abstract).

A total mass of the non-aqueous solvent and the electrolyte salt is taken as 100, an amount of the vinylene carbonate compound is 0.5 to 3 parts by mass per 100 total mass of the non-aqueous solvent and the electrolyte salt; and an amount of the cyclic

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sulfite compound is 0.1 to 2 parts by mass per 100 total mass of the non-aqueous solvent and the electrolyte salt (abstract and examples as applied to claim 3).

The vinylene carbonate compound is vinylene carbonate and ethylene sulfite is the cyclic sulfite compound (abstract as applied to claim 7).

The differences between claims 2 and 7 and JP '611 are that JP '611 does not teach of the casing structure and explosion-proof valve or of the electrolyte further including a an alkylbenzene compound having a quaternary carbon directly bonded to a benzene ring (claim 2), of the positive electrode active material and bulk density (claim 2); and the alkylbenzene compound is at least one selected from the group consisting of tert-butylbenzene, tert-amylbenzene, and tert-hexylbenzene (claim 7).

With respect to the casing structure and explosion proof valve:

Takahashi discloses that the same claimed casing and explosion proof valve is known in the art (abstract and Figs. 1 and 2).

The motivation for using this structure in a lithium battery is to improve the battery safety.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of JP '611 by employing the casing and explosion-proof valve of Takahashi since it would have improved the battery safety.

With respect to the electrolyte further including an alkylbenzene compound having a quaternary carbon directly bonded to a benzene ring:

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Each of JP '909 and JP '229 discloses adding tert-alkylbenzene compounds to a lithium battery nonaqueous electrolyte (abstract as applied to claims 2 and 7).

The motivation for adding this compound to the nonaqueous electrolyte is that it improves the cycling and discharge capacity of the electrochemical cell.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of JP '611 by adding tert-alkylbenzene compounds to a lithium battery nonaqueous electrolyte as taught by either JP '909 or JP '229 since it would have improved the cycling and discharge capacity of the electrochemical cell.

With respect to the active material being a lithium cobalt oxide positive electrode material having a bulk density of 3.3 g/cm<sup>3</sup> or more:

Sunagawa discloses using lithium cobalt oxide materials having a bulk density above 3.3 g/cm<sup>3</sup> (abstract).

The motivation for using lithium cobalt oxide materials having a high bulk density is that it has improved load characteristics (abstract).

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of JP '611 by using lithium cobalt oxide materials having a high bulk density since it would have provided a battery having improved load characteristics.

5. Claims 2, 3, 7 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 2002-025611 A (JP '611) in view of U.S. Patent No. 6,632,572 (Takahashi); U.S. Patent No. 6,818,351 (Sunagawa) and or JP 2002-050398 (JP '398).

JP '611 discloses of a non-aqueous electrolyte secondary cell comprising a positive electrode intercalating and deintercalating lithium ions, a negative electrode intercalating and deintercalating lithium ions, and a non-aqueous electrolyte having a non-aqueous solvent and an electrolyte salt, wherein, the non-aqueous electrolyte includes a vinylene carbonate compound and a cyclic sulfite compound (abstract).

A total mass of the non-aqueous solvent and the electrolyte salt is taken as 100, an amount of the vinylene carbonate compound is 0.5 to 3 parts by mass per 100 total mass of the non-aqueous solvent and the electrolyte salt; and an amount of the cyclic sulfite compound is 0.1 to 2 parts by mass per 100 total mass of the non-aqueous solvent and the electrolyte salt (abstract and examples as applied to claim 3).

The vinylene carbonate compound is vinylene carbonate and ethylene sulfite is the cyclic sulfite compound (abstract as applied to claim 7).

The differences between claims 2, 7 and 9 and JP '611 are that JP '611 does not teach of the casing structure and explosion-proof valve or of the electrolyte further including a phenylcycloalkane compound, or an alkylbenzene compound having a quaternary carbon directly bonded to a benzene ring (claim 2), of the positive electrode active material and bulk density (claim 2); of the phenylcycloalkane compound is at least one selected from the group consisting of phenylcyclohexane, phenylcyclopheptane, and phenylcyclopentane (claim 7); of the phenylcycloalkane being present in the amount specified in claim 9.

With respect to the casing structure and explosion proof valve:

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Takahashi discloses that the same claimed casing and explosion proof valve is known in the art (abstract and Figs. 1 and 2).

The motivation for using this structure in a lithium battery is to improve the battery safety.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of JP '611 by employing the casing and explosion-proof valve of Takahashi since it would have improved the battery safety.

With respect to the electrolyte further including a phenylcycloalkane compound:

JP '398 discloses adding phenylcyclohexane to a lithium battery nonaqueous electrolyte (abstract as applied to claim 2 and 7). The phenylcycloalkane is present in an amount from 0.1-20 wt% which is held to at least significantly overlap, if not encompass the range of claim 9.

The motivation for adding phenylcyclohexane to the nonaqueous electrolyte is that it improves the safety and reliability of the battery and prevents overcharging of the cell.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of JP '611 by adding phenylcyclohexane to the nonaqueous electrolyte as taught by JP '398 since it would have improved the safety and reliability of the battery and prevented overcharging of the cell.



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As to the range of claim 9, it is held above that JP '398 at least significantly overlaps, if not encompasses the range of claim 9. Generally, differences in ranges will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such ranges is critical. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). In re Hoeschele, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969). In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); In re Woodruff, 919, F.2d 1575, 16 USPQ 2d 1934 (Fed. Cir. 1990). It has been held that when the difference between a claimed invention and the prior art is the range or value of a particular variable, then a prima facie rejection is properly established when the difference in the range or value is minor. Titanium Metals Corp. of Am. v. Banner, 778 F.2d 775, 783, 227 USPQ 773, 779 (Fed. Cir. 1985).

With respect to the active material being a lithium cobalt oxide positive electrode material having a bulk density of 3.3 g/cm<sup>3</sup> or more:

Sunagawa discloses using lithium cobalt oxide materials having a bulk density above 3.3 g/cm<sup>3</sup> (abstract).

The motivation for using lithium cobalt oxide materials having a high bulk density is that it has improved load characteristics (abstract).

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of JP '611 by using lithium

cobalt oxide materials having a high bulk density since it would have provided a battery having improved load characteristics.

6. Claims 5, 6, 8 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 2002-025611 A (JP '611) in view of Takahashi, Sunagawa, JP 2002-050398 (JP '398) and either JP 2002-298909 (JP '909) or JP 2002-110229 (JP '229).

JP '611 discloses of a non-aqueous electrolyte secondary cell comprising a positive electrode intercalating and deintercalating lithium ions, a negative electrode intercalating and deintercalating lithium ions, and a non-aqueous electrolyte having a non-aqueous solvent and an electrolyte salt, wherein, the non-aqueous electrolyte includes a vinylene carbonate compound and a cyclic sulfite compound (abstract).

A total mass of the non-aqueous solvent and the electrolyte salt is taken as 100, an amount of the vinylene carbonate compound is 0.5 to 3 parts by mass per 100 total mass of the non-aqueous solvent and the electrolyte salt; and an amount of the cyclic sulfite compound is 0.1 to 2 parts by mass per 100 total mass of the non-aqueous solvent and the electrolyte salt (abstract and examples as applied to claim 3).

The vinylene carbonate compound is vinylene carbonate and ethylene sulfite is the cyclic sulfite compound (abstract as applied to claim 7).

The differences between claims 5 and 8 and JP '611 are that JP '611 does not teach of does not teach of the casing structure and explosion-proof valve or the electrolyte further including a phenylcycloalkane compound and an alkylbenzene compound having a quaternary carbon directly bonded to a benzene ring (claim 5); of the positive active material being a lithium cobalt oxide compound having a particular

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bulk density (claim 5); of the phenylcycloalkane compound is at least one selected from the group consisting of phenylcyclohexane, phenylcycloheptane, and phenylcyclopentane; and the alkylbenzene compound is at least one selected from the group consisting of tert-butylbenzene, tert-amylbenzene, and tert-hexylbenzene (claim 8) or of the total amount of phenylcycloalkane and alkylbenzene being in the range of claim 10.

With respect to the casing structure and explosion proof valve:

Takahashi discloses that the same claimed casing and explosion proof valve is known in the art (abstract and Figs. 1 and 2).

The motivation for using this structure in a lithium battery is to improve the battery safety.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of JP '611 by employing the casing and explosion-proof valve of Takahashi since it would have improved the battery safety.

With respect to the electrolyte further including a phenylcycloalkane compound and an alkylbenzene compound having a quaternary carbon directly bonded to a benzene ring:

Each of JP '229 and JP '909 discloses adding tert-alkylbenzene compounds to a lithium battery nonaqueous electrolyte (abstract as applied to claims 5 and 8).

The motivation for adding this compound to the nonaqueous electrolyte is that it improves the cycling and discharge capacity of the electrochemical cell.

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Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of JP '611 by adding tert-alkylbenzene compounds to a lithium battery nonaqueous electrolyte as taught by either JP '229 or JP '909 since it would have improved the cycling and discharge capacity of the electrochemical cell.

JP '398 discloses adding phenylcyclohexane to a lithium battery nonaqueous electrolyte (abstract as applied to claims 5 and 8).

The motivation for adding phenylcyclohexane to the nonaqueous electrolyte is that it improves the safety and reliability of the battery and prevents overcharging of the cell.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of JP '611 by adding phenylcyclohexane to the nonaqueous electrolyte as taught by JP '398 since it would have improved the safety and reliability of the battery and prevented overcharging of the cell.

As to the amount of both phenylcycloalkane and alkylbenzene recited in claim 10:

As to the range of claim, it is held above that JP '398 at least significantly overlaps, if not encompasses the same general amount of phenylcycloalkane. In addition each of JP '229 and JP '909 teach of similar amounts for the alkylbenzene. In each instant the amount of the additive is in a range from 0.1-20 wt% (JP '398 abstract; JP '909, paragraph 9 and JP '229 paragraph 13). The common teaching throughout these references is to limit the additive to less than 20wt% and as low as 0.1wt% to get

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the additive effect of each of these components in the battery. Thus the suggestive teaching of the prior art is to limit either one or a combination of additive to the battery upon the evidence of a decrease in battery performance in the presence of too much additive materials. Generally, differences in ranges will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such ranges is critical. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). In re Hoeschele, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969). In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); In re Woodruff, 919, F.2d 1575, 16 USPQ 2d 1934 (Fed. Cir. 1990). It has been held that when the difference between a claimed invention and the prior art is the range or value of a particular variable, then a prima facie rejection is properly established when the difference in the range or value is minor. Titanium Metals Corp. of Am. v. Banner, 778 F.2d 775, 783, 227 USPQ 773, 779 (Fed. Cir. 1985).

As to the lithium cobalt oxide positive electrode material having a bulk density of 3.3 g/cm<sup>3</sup> or more.

Sunagawa discloses using lithium cobalt oxide materials having a bulk density above 3.3 g/cm<sup>3</sup> (abstract).

The motivation for using lithium cobalt oxide materials having a high bulk density is that it has improved load characteristics (abstract).

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of JP '611 by using lithium cobalt oxide materials having a high bulk density since it would have provided a battery having improved load characteristics.

### ***Response to Arguments***

7. Applicant's arguments with respect to claims 2, 3, 5-10 have been considered but are moot in view of the new ground(s) of rejection.

Applicant now shifts their arguments to the claimed combination now not reasonably teaching or suggesting the claimed feature of the positive electrode active material recited therein having a bulk density of 3.3 g/cm<sup>3</sup> or more.

Applicant's argument is not persuasive for the following reasons:

First, the claims do not preclude the combination of positive active material as recited in Sunagawa and thus can include a mixture of lithium cobalt compound oxide as well as lithium manganese oxide. Thus for at least this reason, Applicant's argument is flawed and not persuasive.

Second, Applicants own specification discloses that the positive electrode material can be one compound selected from the transition metal compound oxides containing lithium, or a mixture of two or more thereof. Specifically, the examples include lithium cobalt oxide, lithium nickel oxide, lithium manganese oxide, ..." (see page 33, ll. 2-7). Thus the arguments presented by Applicant appear to be contradictory to the full disclosure of the original application which clearly suggests cathode mixtures including lithium cobalt oxide and lithium manganese oxide. Since the

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currently presented position appears contradictory to the full disclosure of the original specification and since there is no clear and convincing evidence to support Applicant's assertion, the rejection stands.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gregg Cantelmo whose telephone number is 571-272-1283. The examiner can normally be reached on Monday to Thursday, 8:00-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pat Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



gc  
June 21, 2007

Gregg Cantelmo  
Primary Examiner  
Art Unit 1745